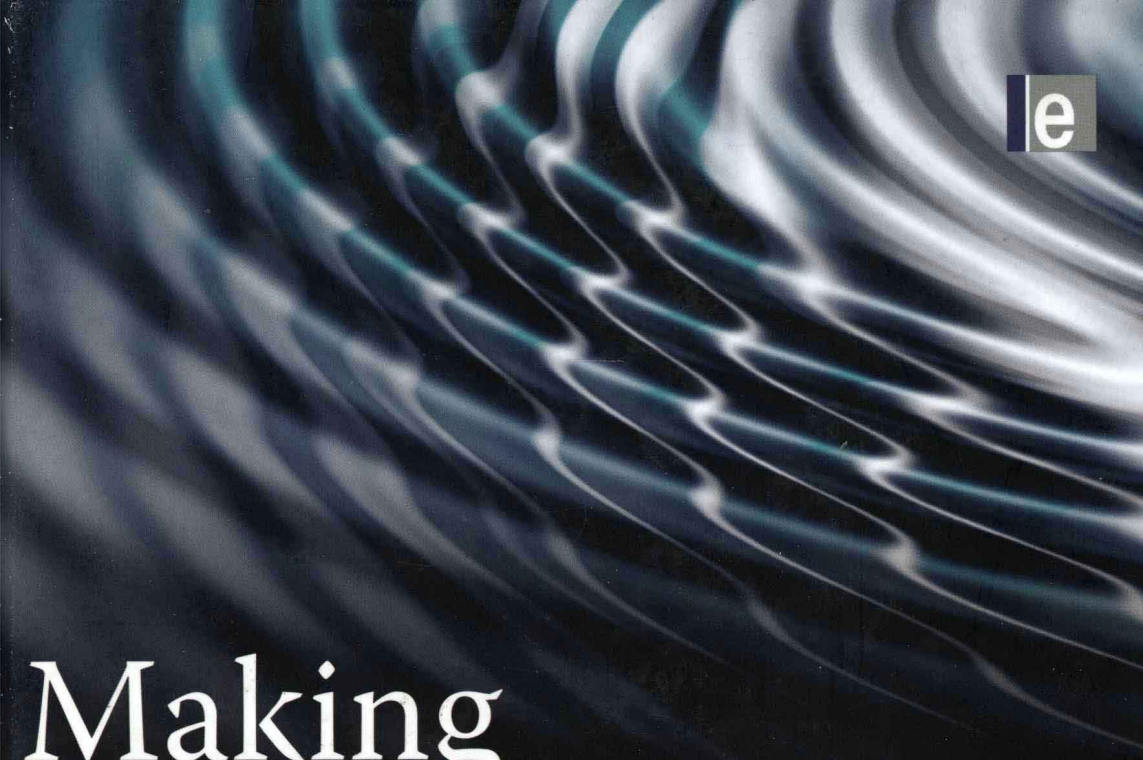

Making the Most of the Water We Have

The Soft Path Approach to Water Management

Edited by
David B. Brooks, Oliver M. Brandes and Stephen Gurman

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earthscan
publishing for a sustainable future

London • Sterling, VA

First published by Earthscan in the UK and USA in 2009

ISBN: 978-1-84407-754-0

Typeset by MapSet Ltd, Gateshead, UK
Cover design by Clifford Hayes

For a full list of publications please contact:

Earthscan
Dunstan House
14a St Cross St
London, EC1N 8XA, UK
Tel: +44 (0)20 7841 1930
Fax: +44 (0)20 7242 1474
Email: earthinfo@earthscan.co.uk
Web: **www.earthscan.co.uk**

22883 Quicksilver Drive, Sterling, VA 20166-2012, USA

Earthscan publishes in association with the International Institute for Environment and Development

A catalogue record for this book is available from the British Library

Library of Congress Cataloging-in-Publication Data

Making the most of the water we have : the soft path approach to water management / edited by David B. Brooks, Oliver M. Brandes, and Stephen Gurman.
p. cm.
Includes bibliographical references and index.
ISBN 978-1-84407-754-0 (hardback)
1. Water resources development–Environmental aspects. 2. Water-supply–Management–Environmental aspects. I. Brooks, David, B., 1934– II. Brandes, Oliver M., 1972– III. Gurman, Stephen.
TD195.W3M35 2009
363.6'1–dc22

2009005726

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This book was printed in the UK by
CPI Antony Rowe, Chippenham.
The paper used is FSC certified and the inks are vegetable based.

List of Contributors

Editors

Oliver M. Brandes is a political ecologist who serves as Associate Director for the University of Victoria's POLIS Project on Ecological Governance. He has a background in law, economics and ecological restoration, and leads the POLIS Water Sustainability Project. His work focuses on practical aspects of sustainable water resource management and ecologically based legal and institutional reform: omb@uvic.ca

David B. Brooks, who was educated in geology and economics, retired several years ago after 14 years with Canada's International Development Research Centre. He now serves as Senior Advisor – Fresh Water for Friends of the Earth – Canada. His main research interests lie in the linkages between environmental protection, on the one hand, and the use of minerals, energy and water, on the other: david.b.brooks34@gmail.com

Stephen Gurman is a consultant with experience in environment and development, project management, community development and communications. He has worked with Canadian and international NGOs, CIDA and Industry Canada and spent five years in Africa with a Canadian volunteer-sending organization. Stephen has a Mechanical Engineering degree from McGill University (1972): steve.gurman@sympatico.ca

Contributing authors

Sara Ahmed has been working on the political economy of water in India for the past 20 years. After obtaining her PhD from Cambridge University (1991), Sara taught at the Institute of Rural Management, Anand, India. She is currently working with IDRC, New Delhi, and her primary responsibility will be to develop, with her team, a research programme for South Asia that addresses critical questions of food and water security in the context of climate change, adaptation and growing conflict: sahmed@idrc.org.in

Henning Bjornland holds two academic positions; he is a Canada Research Chair in Water and the Economy – International at University of Lethbridge, Alberta, Canada and an Associate Research Professor at the University of

South Australia. He has researched water management and policy issues in Australia since 1993 and in Canada since 2005: henning.bjornland@uleth.ca

Graham Daborn was Professor of Biology at Acadia University and the first Director of the Arthur Irving Academy for the Environment. Previously (1984–2004) he was the Director of the Acadia Centre for Estuarine Research. He is currently co-chair of the Program Management Committee for the Canadian Water Network: graham.daborn@acadiau.ca

Kurtis Elton holds a Bachelor of Arts & Science from McGill University, where he majored in chemistry. He is currently studying at the University of Waterloo as a Master's candidate in the Faculty of Environment, and enjoys drawing cerebral comics for the school's newspaper: kelton@envmail.uwaterloo.ca

Peter H. Gleick is co-founder and president of the Pacific Institute for Studies in Development, Environment, and Security in Oakland, California. His research and writing address the critical connections between water and human health, the hydrologic impacts of climate change, sustainable water use, privatization and globalization, and international conflicts over water resources. He was named a MacArthur Fellow in October 2003 and was elected to the US National Academy of Sciences: pgleick@pipeline.com

Andrew Hellebust, P.Eng., received training in chemical engineering and biology at the Bachelor's level at the University of Toronto and at the Master's level at Princeton University. Since 1994, he has worked in the field of small-scale and decentralized water and wastewater treatment and is president of Rivercourt Engineering Inc. He balances consulting, design and research in his practice and is a research associate with the Centre for Alternative Wastewater Treatment at Fleming College, Lindsay, Ontario: ahellebust@rivercourt.ca

Elizabeth Hendriks completed a Masters in Environment Studies from the University of Waterloo during which she received a Water Policy Fellowship from the Walter and Duncan Gordon Foundation. She is currently a research associate managing a two-year research project on the role of residential home builders in the uptake of water efficiency innovation: hendriks.elizabeth@gmail.com

Susan Holtz currently works with the Canadian Institute for Environmental Law and Policy as senior policy analyst. She has done projects on many aspects of energy, environment and sustainable development, including being one of the Canadian soft energy path analysts, as well as part of the Canadian water soft path study team: cielap@cielap.org

Lisa Isaacman is a conservation scientist with a Bachelors of Science in Environmental Sciences from the University of Guelph and a Masters of Environmental Studies from Dalhousie University. Her diverse areas of interest include habitat and wildlife protection, environmental policy and stewardship: isaacman@dal.ca

Inga Jacobs is a Researcher in the Water Governance Systems Research Group at the Council for Scientific and Industrial Research in South Africa. She is currently completing her PhD at the School of International Relations, University of St Andrews, Scotland in Transboundary Cooperative Management and Water Politics in Africa: Ijacobs@csir.co.za

Sarah Jordaan is a PhD candidate at the University of Calgary in both Energy and Environmental Systems and Environmental Design. Her first degree was in Physics from Memorial University of Newfoundland. Her research interests lie in assessing land use of energy developments from a life cycle perspective: smjordaa@ucalgary.ca

Paul Kay is Chair, Department of Environment and Resource Studies, University of Waterloo. Since his PhD (Geography, University of Wisconsin-Madison), he has studied climatic variability and water resources from a variety of angles in a variety of settings: pkay@fes.uwaterloo.ca

Simone Klawitter has more than 10 years experience with governmental and non-governmental water agencies, as policy advisor, consultant and academic. She specializes in water economics with focus on water pricing, utility regulation, institutional development, and innovative financing instruments. After many years in the Middle East she now works as financial advisor in Southern Africa on behalf of the German Development Cooperation. She has studied physics and law and holds a PhD in economics: mail@klawitter-berlin.com

Geoff Kuehne has had a 25-year career as a wheat/sheep farmer in South Australia. After selling his farm in 2000, he completed an MBA, and then a PhD researching irrigators' management behaviour. His research interest focuses on identifying and exploring how farmers' non-profit-maximizing values influence their behaviour: Geoff.Kuehne@csiro.au

Carol Maas is the Director of Innovation for the POLIS Water Sustainability Project and is the primary investigator for the water–energy nexus research theme. She is a professional engineer with 10 years of water and wastewater engineering background, including consulting, R&D and process engineering: c.maas@polisproject.org

Tony Maas is Senior Freshwater Policy Advisor with World Wildlife Fund – Canada. Prior to joining WWF, Tony worked extensively on developing the water soft path concept with the University of Victoria's POLIS Project on Ecological Governance. He has studied Environmental Science at Royal Roads University in Victoria and Water Governance at the University of Waterloo.

Robert Sandford is the Chair of the Canadian Partnership Initiative in support of the United Nations International 'Water for Life' Decade; a member of the Advisory Committee for the Rosenberg International Forum on Water Policy; and Director of the Western Watersheds Climate Research Collaborative, a

research and public policy consortium of universities, research institutions and government agencies involved in water and water-related climate research in the river basins that originate in Canada's western mountains: sandford@telus-planet.net

Carla Stevens specializes in integrated land use and watershed management. She has worked in the non-government, provincial government and private sectors in Canada. Her research and work experience in alternative approaches to watershed management led to her desire to address the challenges of implementing innovative water management policy: carla.m.a.stevens@gmail.com

Anthony Turton is a water resource specialist focusing on water and human health risks from radionuclide and heavy metal contamination from the gold mining industry in South Africa. He is a Director of TouchStone Resources (Pty) Ltd that works at the interface between new water, new energy and socio-economic development: tony@anthonyturton.com

Gareth Walker holds a BSc in Physics and an MSc in Water Science and Policy. He is currently a research associate with Waterwise, an independent non-governmental organization with a remit to reduce water consumption within the UK. Past work has included developing Waterwise policy on water affordability and economic incentives for efficiency. His current focus is on the water, energy and carbon relationships in domestic consumption: gwalker@waterwise.org.uk

Sarah E. Wolfe is an Assistant Professor in the Department of Environment and Resource Studies at the University of Waterloo, Canada. Her doctoral research examined the interplay between social networks, knowledge and water demand management in southern Africa and Canada (Ontario). Sarah's current research examines tacit knowledge and water efficiency innovations in the residential building sector; upcoming research will explore the gender dimensions of Canadian water policy.

Foreword

Soft Path Approach in Water Resources Management and Policy Reform

Water users and water managers need all the help they can get if they are to avoid destroying the capacity of our water environments to provide secure water services. As we begin a new century, after nearly 150 years of 'modern' water engineering efforts, major flaws are beginning to appear in what has seemed a water management success story. Today's populations and their water consuming ways are exerting unprecedented pressures on the world's surface and groundwater resources. Society and its political leaders obstinately refuse to engage effectively with the dangers resulting from the rising trend in collective global water consumption. We are still living with our beliefs and biases that water should be free in our homes and, where possible, for our livelihoods. Our startling lack of response to the dangers that face us seems to indicate that we are ill-equipped to evaluate risks of the type and scale that human demands are placing on our environment. 'It is a miracle that we get anything right' (Ferguson, 2009). The analysis of approaches to managing water resources in this useful book highlights the risks of our water consuming ways. It emphasizes the role of human behaviour in overusing and spoiling the diminishing supply of fresh water resources upon which we all depend, and, per contra, how human ingenuity can get us out of the trap we have built for ourselves.

Demand management is one dimension of the rich soft path approach. Demand management policies and demand management practices address the issue of water use efficiency – more output per drop and more jobs per drop. They promote measures that achieve technical and economic efficiency by improving the returns to water from investing in technologies that increase efficiency and reduce waste. Water efficiency can be doubled and water pollution significantly reduced by technically efficient measures.

Still more powerful is the soft path approach of allocative efficiency. This approach has vastly more potential to increase returns to water than the hard path technical approaches. However, experience shows that, though the soft approach is economically rational, it is also politically contentious. The soft path approach requires that water users change the way they use and manage water. At home people can shower rather than bathe, remove thirsty plants from the garden, cease watering the garden altogether and generally use water

more carefully. They can be given incentives to use less by being charged higher prices for metered water. But while introducing properly maintained water metering and billing systems always induces a modest reduction in use, users do not welcome them. Politicians are predictably wary of such reforms.

The forces that have put the hard path approaches in place are deeply entrenched – professionally, institutionally and politically. It has been difficult for soft path approaches to make inroads as they are often associated with unpopular changes in the ways of using water. Unpopular measures incur political prices. Invisible, 'politics-lite' soft path policies and practice have been adopted much more readily – if unconsciously. They have been very effective in the second half of the 20th century in improving returns to water. They have been much more significant than consciously deployed soft path measures.

The soft path approaches that have reallocated water from low return to high return activities – from low-value to high-value crop production and from relatively low-value irrigation to very high-value industries and services – have had unintended consequences. Of course, they have had efficiency impacts. Even more important they have brought water and food security to regions that are seriously water scarce. Water reallocated in diversifying industrial economies enables the *water scarce* to trade their way to water and food security. Singapore, Israel and Malta are examples. Invisibly and silently, and without destabilizing political conflicts, economic diversification reallocated water to activities and sectors that brought very high returns to scarce water.

But soft path approaches are not just about economic efficiency and improving economic returns to water. As Canadian author Margaret Atwood emphasizes, 'The economy is a wholly owned subsidiary of the environment.' The soft path approach is not just about more crop and jobs per drop. It also addresses the issues of the sustainable management of water. More care per drop is also a high priority as it prevents the irreversible impairment of surface water and groundwater. The soft path approach also recognizes the water–energy nexus. This nexus is associated with *three weddings* and *avoiding two funerals*. The weddings are first, the production of *clean* energy from water; second, the production of usable water with *clean* energy; and third, the extraordinary role of *economic diversification*, *socio-economic development* and *trade* in enabling environments and economies to be sustainable. The first funeral to be avoided is the destruction of the atmosphere through the profligate use of fossil energy; the second is avoiding serious impairment of the aquatic environment as a consequence of using it as a sink for industrial and agricultural pollution.

The book provides a timely review of how political economies worldwide have been introducing soft path approaches. It is immensely strengthened by authors who introduced the idea to the water sector and diffused it among water scientists, engineers and planners. Many of them have written chapters in this book.

The term soft path has proved to be a *sticky idea* that has begun to gain currency. For those managing water and engaging in its contentious allocative

politics, the term draws attention to the existence of alternatives to the familiar supply-side approaches. The soft path approach is intuitively holistic and requires that water users as well as water professionals be informed and engaged with the ecology of water and with the multiplicity of stakeholders who use water. It is precautionary because it helps society avoid the funerals of the degraded water environment and of the poisoned atmosphere by recognizing the air/water/energy nexus. Finally, the soft path approach is timely and appropriate in that it fosters the good governance of water in ways that constructively engage the social solidarities involved in the use and management of water.

Professor Tony Allan
King's College London and the School of Oriental and African Studies,
University of London, UK

References

Ferguson, N. (2009) 'This much I know', *The Observer Magazine*, 18 January, p10

Acknowledgements

This book began as a series of conversations in 2003 about how environmental non-governmental groups might expand the typically constrained discussion about water policy to a more holistic alternative. A clear recurring theme in the discussions was a belief that by putting emphasis on *why we were using so much water* as opposed to *how we might use it better* might provide a real opportunity to create a more sustainable future. The issues centred on the human role in choosing how to use water instead of just on the technologies we had come to depend upon. Several people, including Peter Gleick in the United States and Harry Swain in Canada suggested that we adapt Amory Lovins' soft energy path to fresh water. Early work was done at Friends of the Earth – Canada in collaboration with Gregory Rose, Rob de Loë, Robert Patrick and, more generally on water sustainability, with Keith Ferguson and Michael M'Gonigle at the University of Victoria's POLIS Project on Ecological Governance. Initial support for an in-depth analysis of soft path applications in Canada was arranged by Jennifer Moore in Environment Canada and later by the ongoing and even courageous support of Brenda Lucas at the Gordon Foundation. Though not directly related to the production of this book, they all deserve some credit for the material that appears in it.

The book itself also has had significant support from a variety of people not only providing research and design and technical support, but also review, encouragement and development of ideas and concepts through thoughtful discussion, including notably Rod Dobell, Susanne Porter-Bopp, Ellen Reynolds, Ray Travers, Jennifer Wong and Ann Zurbrigg at the University of Victoria's POLIS Project for Ecological Governance. Nicola Ross and Marcia Ruby were critical in arranging initial publication of our research results in the July 2007 issue (vol 33, no 4) of the Canadian environmental journal, *Alternatives*, and also granted permission for us to use some figures that were originally prepared for that issue. Beatrice Olivastri and Karen Cartier at Friends of the Earth – Canada provided ongoing support throughout the whole process from tentative explorations to completion of the manuscript. Tim Morris at the Gordon Foundation provided funding for a mid-project meeting of the three editors at the offices of the Foundation in Toronto. Others who were involved with preparation of material leading up the book included Lynn Barber, Matt Binstock, Anja Grauenhorst, Alina Michalska and Nabeela

Rahman. For suggesting Canadian poems from which to select quotations, we thank Toby Brooks and Sheila Forsyth.

Our long-time colleague Diane Beckett deserves special thanks for taking on the task of reading the whole text through and getting her overall review and comments back to us in the shortest possible time.

House of Anansi Press kindly gave us permission to use material in Chapter 3 that had previously been published in an article by Susan Holtz and David Brooks entitled 'Reverse Engineering: Soft Energy Paths' in the 2003 book, *Fueling the Future: How the Battle Over Energy is Changing Everything*. The journal *Water International* gave us permission to use material in Chapter 7 that had previously been submitted to the journal for publication as an article by David Brooks and Susan Holtz. Finally, we express our thanks to Tim Hardwick at Earthscan for his general monitoring of our process through to publication, and for patiently answering our interminable series of questions about format.

David B. Brooks, Oliver M. Brandes and Stephen Gurman

List of Acronyms and Abbreviations

ALUS	Alternative Land Use Services
BAU	business as usual
CAWP	Coalition Against Water Privatisation (South Africa)
CMA	Catchment Management Agency
CMHC	Canada Mortgage and Housing Corporation
CoAG	Council of Australian Governments
CRD	Capital Regional District
CSIR	Council for Scientific and Industrial Research (South Africa)
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CWWA-WEN	Canadian Water and Wastewater Association's Water Efficiency Network
Defra	Department for Food, Environment and Rural Affairs
DWAF	Department of Water Affairs and Forestry (South Africa)
DWI	Drinking Water Inspectorate
EA	Environment Agency
EEB	European Environmental Bureau
ELV	Emission Limited Values
ENGOs	environmental non-government organizations
EQS	Environmental Quality Standards
ERR	Earthquake Reconstruction and Rehabilitation
EU	European Union
FCM	Federation of Canadian Municipalities
GDP	gross domestic product
GLC	Great Lakes Commission
GLSLRB	Great Lakes–St Lawrence River Basin
GMID	Goulburn-Murray Irrigation District
GNP	gross national product
GVRD	Greater Vancouver Regional District
GWP	Global Water Partnership
GWSSB	Gujarat Water Supply and Sewerage Board
IDRC	International Development Research Centre (Ottawa)

IJC	International Joint Commission
IWRM	Integrated Water Resources Management
LCA	life cycle assessment
LCD	litres per capita-day
MDB	Murray-Darling Basin
MDBMC	Murray-Darling Basin Ministerial Council
MENA	Middle East and North Africa
Mm^3	million cubic metres
NGOs	non-governmental organizations
NRTEE	National Round Table on the Environment and the Economy
NWI	National Water Initiative (CoAG)
O&M	operations and maintenance
OECD	Organisation for Economic Co-operation and Development
Ofwat	Water Services Regulatory Authority
OPEC	Organization of Petroleum Exporting Countries
RMI	Rocky Mountain Institute
RSC	rural service council (South Africa)
SOPPECOM	Society for Promoting Participative Ecosystem Management (Pune)
SPA	soft path analysis
THM	trihalomethanes
TISS	Tata Institute of Social Studies (Mumbai)
UN	United Nations
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Social and Cultural Organization
WAGRICO	Water Resources Management in Cooperation with Agriculture project
WASMO	Water and Sanitation Management Organisation (India)
WDM	water demand management
WEDO	Women's Environment and Development Organization
WEPs	Water Efficiency Plans/Policies
WFD	Water Framework Directive (EU)
WHO	World Health Organization
WMAs	water management areas
WRI	World Resources Institute
WRPC	Water Resources Policy Commissions
WSEP	Water Strategy Expert Panel
WSP	water soft paths
WUAs	water user associations

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